AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior versions of claims in the application.

1. (Currently Amended) A system that facilitates measurement, analysis, and automatic maintenance of fluid, comprising:

a casing that is immersed in a fluid, the casing comprising a plurality of apertures that are opened to permit the fluid to enter the casing, and closed to confine a sample of the fluid within the casing; ~~and~~

a sensing element within the casing that measures at least one parameter of the sample of the fluid confined within the casing; and

a three electrode system that facilitates measurement of oxidation levels of the sample of the fluid.

2. (Original) The system of claim 1, wherein one of an actuator and a MEMs valve facilitates opening and closing the plurality of apertures.

3. (Original) The system of claim 1, the casing being a probe tip.

4. (Original) The system of claim 3, wherein the plurality of apertures are opened and closed *via* rotating an outer cylinder of the probe tip.

5. (Original) The system of claim 4, wherein shear viscosity of the fluid is measured at least in part by monitoring an energy required to rotate the outer cylinder of the probe tip.

6. (Original) The system of claim 3, wherein the probe tip comprises a power source to provide power to the sensing element.

7. (Original) The system of claim 6, further comprising a display that communicates information relating to the sample of the fluid to a user.

8. (Original) The system of claim 1, the sensing element utilized in connection with measuring at least one of temperature, pH, TAN, SAN, oxidation/reduction potential, H_2O, oxidation levels, conductivity, ferrous contamination, additive state, and chemical contaminants of the fluid.

9. (Original) The system of claim 1, further comprising a heating/cooling component to heat and/or cool the sample of fluid confined within the casing.

10. (Original) The system of claim 1, further comprising a screen that prevents contaminants in the fluid from contacting the sensor element.

11. (Original) The system of claim 10, wherein closing the plurality of aperture(s) facilitates flushing contaminants from the screen.

12. (Original) The system of claim 1, further comprising a screen that prevents contaminants from entering at least one of a fluid flow line or a fluid reservoir within a machine.

13. (Original) The system of claim 12, wherein closing the plurality of aperture(s) facilitates flushing contaminants from the screen.

14. (Original) The system of claim 1, further comprising a flushing mechanism that removes fluid from the casing.

15. (Original) The system of claim 1, further comprising a control component that alters at least one of fluid volume within a machine and fluid chemistry within a machine based at least in part upon measurements received from the sensing element.

16. (Original) The system of claim 15, the control component comprising an artificial intelligence component that infers fluid maintenance actions based at least in part upon user state, user context, and historical use of a machine, wherein the fluid maintenance actions include altering at least one of fluid volume within a machine and fluid chemistry within a machine.

17. (Original) The system of claim 1, further comprising a display that communicates at least one of predictive maintenance information and preventative maintenance information to a user.

18. (Cancelled)

19. (Original) The system of claim 18, wherein cyclical voltammetric techniques are utilized to measure oxidation levels of the sample of the fluid.

20. (Original) The system of claim 18, wherein oxidation levels of the sample are reduced by applying a substantially greater voltage for a substantially greater time during a reduction phase as compared to an oxidation phase.

21. (Original) The system of claim 20, further comprising micro-electronic magnetic structures that attract ferrous metallic particles from the fluid.

22. (Original) The system of claim 21, wherein an amount of ferrous materials attracted by the micro-electronic magnetic structures is measured by at least in part by at least one of measuring conductivity between the sensor electrodes, measuring plating energy, measuring capacitive strength between sensor electrodes, and measuring di-electric strength between sensor electrodes.

23. (Currently Amended) The system of claim 1, further comprising piezoelectric material that is employed to measure vibration of ~~the~~ a machine.

24. (Original) The system of claim 23, the piezoelectric material further employed to provide power to the sensing element.

25. (Original) The system of claim 1, wherein the casing comprises a plurality of sensing elements, and data fusion techniques are employed to analyze measurements obtained by the plurality of sensing elements.

26. (Original) The system of claim 25, wherein the analyzed measurements are utilized to facilitate altering at least one of volume of the fluid within a machine and fluid chemistry within a machine.

27. (Original) The system of claim 1, wherein the casing comprises a processor that effectuates data fusion of measurements obtained by the sensing element.

28. (Original) The system of claim 1, further comprising a component that facilitates altering chemical composition of the sample of fluid prior to altering chemical composition of a larger fluid volume.

29. (Original) The system of claim 28, further comprising a component that meters an amount of additive to inject into the sample of fluid.

30. (Original) The system of claim 1 employed to analyze a biological fluid.

31. (Original) The system of claim 1 employed to analyze ground water.

32. (Original) The system of claim 1 employed to analyze machinery lubrication.

33. (Original) The system of claim 1, further comprising at least one of a chemical model, an electro-chemical model, and a prognostics model to analyze the at least one measured parameter.

34. (Original) A method that facilitates real-time *in situ* measurement, analysis, and automatic maintenance of fluid, comprising:

immersing a casing within a fluid, wherein the casing comprises a plurality of apertures that can be opened and closed, and the fluid is within one of a flow line and a reservoir;

opening the apertures to enable a sample of fluid to enter the casing;

closing the apertures to confine the sample of fluid within the casing; and

measuring at least one parameter of the sample of fluid.

35. (Original) The method of claim 34, further comprising:

automatically altering volume of fluid within one of the fluid flow line and the fluid reservoir based at least in part upon the measured parameter.

36. (Original) The method of claim 34, further comprising:

automatically altering fluid chemistry within one of the fluid flow line and the fluid reservoir based at least in part upon the measured parameter.

37. (Original) The method of claim 34, wherein the measured parameter is at least one of temperature, pH, TAN, SAN, oxidation/reduction potential, H_2O, oxidation levels, conductivity, ferrous contamination, additive state, and chemical contaminants of the fluid.

38. (Original) The method of claim 34, further comprising providing a working electrode, a counter electrode, and a reference electrode to facilitate measuring an oxidation level of the sample of fluid.

39. (Original) The method of claim 38, further comprising utilizing the working electrode, counter electrode, and reference electrode to facilitate reduction of the oxidation level of the sample fluid.

40. (Original) The method of claim 34, further comprising flushing the sample of fluid from the casing.

41. (Original) The method of claim 34, further comprising:
injecting an additive into the confined sample of fluid;
oxidizing the confined fluid; and
analyzing a degree of oxidation and amount of additive injected.

42. (Original) A method for reducing oxidation levels in a fluid, comprising:
confining a sample of fluid within a casing;
providing a working electrode, a counter electrode, and a reference electrode within the casing; and
reducing oxidation levels in the sample of fluid by utilizing cyclical voltammetric techniques, wherein a substantially greater voltage is applied for a substantially greater time during a reduction phase as compared to an oxidation phase.

43. (Original) The method of claim 42, further comprising utilizing cyclical voltammetric techniques to measure an oxidation level within the fluid.

44. (Currently Amended) A system that facilitates maintenance of fluid within machinery, comprising:
means for confining a sample of fluid within a casing;
means for measuring at least one parameter of the sample of fluid; ~~and~~
means for flushing the sample of fluid from the casing; and
means for reducing an oxidation level in the sample of fluid.

45. (Cancelled)

46. (Original) The system of claim 44, further comprising means for altering at least one of the volume of the fluid within machinery and fluid chemistry of fluid within machinery.